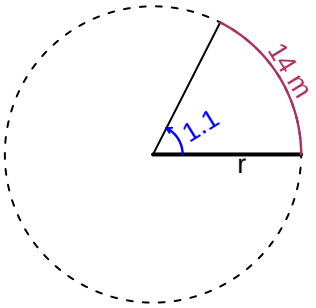
Name: Date:

Trig Final (SLTN v634)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 14 meters. The angle measure is 1.1 radians. How long is the radius in meters?

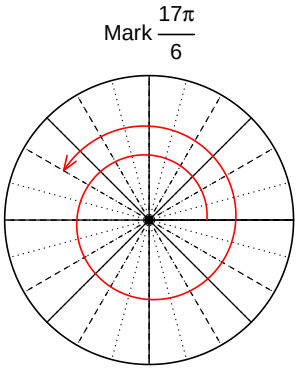


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

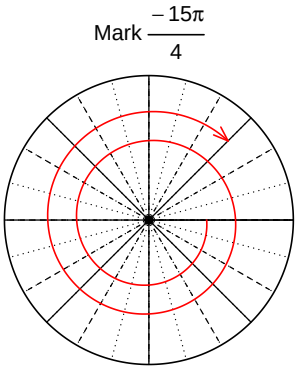
$r = 12.73$ meters.

Question 2

Consider angles $\frac{17\pi}{6}$ and $\frac{-15\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{17\pi}{6}\right)$ and $\cos\left(\frac{-15\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\sin(17\pi/6)$



Find $\cos(-15\pi/4)$

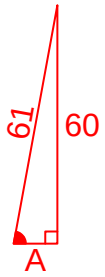
$\sin(17\pi/6) = \frac{1}{2}$

$\cos(-15\pi/4) = \frac{\sqrt{2}}{2}$

Question 3

If $\sin(\theta) = \frac{60}{61}$, and θ is in quadrant II, determine an exact value for $\cos(\theta)$.

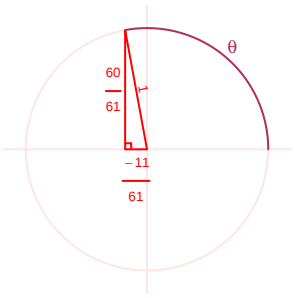
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$A^2 + 60^2 = 61^2$$
$$A = \sqrt{61^2 - 60^2}$$
$$A = 11$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.



$$\cos(\theta) = \frac{-11}{61}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = -3.65$ meters, an amplitude of 7.19 meters, and a frequency of 8.42 Hz. At $t = 0$, the mass is at the midline and moving up. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 7.19\sin(2\pi 8.42t) - 3.65$$

or

$$y = 7.19\sin(16.84\pi t) - 3.65$$

or

$$y = 7.19\sin(52.9t) - 3.65$$